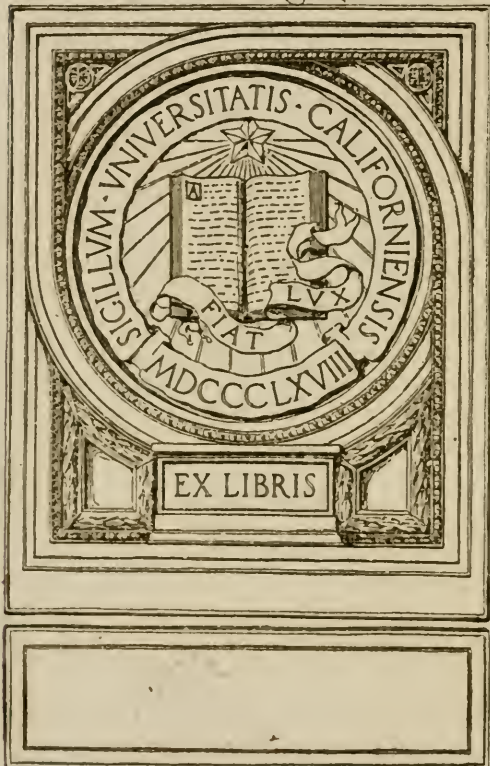


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Important Orchard Pests

and

Spray Formulae

with

General Outlines for Spraying of Apple
and Peach Orchards

By

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IMPORTANT ORCHARD PESTS AND SPRAY FORMULAE

INTRODUCTION

Only the leading spray mixtures are here mentioned. All have merit in the control of particular insect or plant diseases. It is, however, essential that care be used not only in selecting the right material, but in the time and thoroughness of application. No spraying takes the place of orchard feeding or pruning.

SPRAYING FOR INSECTS

Two chief principles govern spraying for insects:

1. Arsenical or other poisons put on foliage or immature fruits will be eaten by insects which feed on the surface of the leaf or fruit. Among such surface-feeding insects are currant worms, apple worms, canker worms and the various forest caterpillars.

2. Sprays which kill insects by contact with their bodies are used for insects which are not surface feeders. Such insects cause damage by puncturing the leaves or bark to suck interior plant juices. Among these sucking insects are the various scale insects, plant lice and pear psylla. Against such insects oils, soaps, tobacco extracts and lime-sulphur sprays are used. Money is wasted annually in attempting to control this class of insects with poison sprays.

Among the insects which are not within reach of either contact or poison sprays are the pear midge, apple and cherry maggot, various borers and leaf miners.

San José Scale.—This Asiatic insect of the bark louse family caused damage in California for years previous to its introduction into eastern United States. It was first found east of the Rocky Mountains in 1893. This is a typical sucking insect which draws its nourishment from plants by means of the mouth parts that pierce the inner tissues. Over the insect is a waxy scale

covering, circular in form. Slightly infested bark shows, in winter and spring, minute dark cones about the size of pin heads, often accompanied by a reddish discoloration of the surrounding bark. When the bark is crowded with insects many dead ones of light color give an ashy appearance and the inner bark may show much discoloration. In June young come forth and crawl about, but shortly insert their mouth parts and become fixed in their life position. Several broods follow throughout the summer, the later ones settling upon the fruit and causing much spotting. Treatment is most successful while leaves are off and the temperature is above freezing. Lime-sulphur, prepared at home or the commercial product, is the standard remedy. Miscible oils are also effective when thoroughly applied, as is whale oil soap at 2 pounds per gallon of water.

Oyster Shell Bark Louse and Scurfy Scale.—These common scale insects are larger and lighter than the San José scale. Both winter as eggs beneath the scale covering and issue about June 10 to 15. While young, they may be killed by any of the common strengths of contact sprays but, where lime-sulphur at winter strength is being regularly used, enough material will adhere to the bark to control the young of the above scales when they hatch.

Aphides.—These plant lice are usually brought to notice through the curled appearance of leaves on terminal shoots of young apple, plum or cherry trees. The lice suck the interior leaf juices and are killed by soap solutions, tobacco extracts, oil emulsions or other contact sprays applied at summer strength. Treatment before the leaves curl is of advantage, since the insects can then be more readily hit.

Codling Moth.—Wormy apples are almost wholly due to the larvae which hatch from the eggs of this moth. The eggs are laid from 10 to 20 days after blossom time. On hatching, the minute worms usually seek entrance to the apple at the blossom end where they feed upon the fleshy stamens and in the calyx before entering the apple. Any arsenical poison there will kill the insect. Paris green and arsenate of lead have both proven effective. Either may be combined with bordeaux when used for fungous diseases, but only the arsenate of lead is adapted for combination with the dilute lime-sulphur now used at summer strengths. (See

outline for apple orchard spraying, page 488.) Just after the blossoms fall a spray driven directly toward the upturned apple calyx is best. A spraying 2 or 3 weeks later adds to the protection, but after the calyx lobes close it is almost impossible to get the poison where needed. A late brood occasionally issues in July, in which case a late spraying is in order.

Pear Psylla.—When abundant this insect is found in the axils of pear leaves. In mid-summer a sweet secretion termed “honey dew” hides the insect. A fungus often thrives in the “honey dew”, giving it a dark, sooty appearance. Control is by contact sprays only, although in winter many of the adult winged insects may be killed by scraping off and burning the loose bark under which they hide. Tobacco extracts and whale oil soap sprays are effective summer sprays, but to secure contact with the insects spraying should be done before the drop of “honey dew” develops or when it has been washed away by rains.

Tent Caterpillars.—These build the common webs often seen during late spring upon wild cherry and apple trees. The winter is passed in a ring-like egg mass on small twigs. Arsenical poisons used either alone or with fungicides will afford control if applied when the leaves first appear.

Canker Worms.—These “measuring” worms, when abundant, defoliate apple trees in May or June. They hatch soon after the leaves appear and when disturbed will hang from a silken strand. At the first appearance of the canker worm, a thorough spraying with arsenate of lead, 2 pounds to 50 gallons of water, is an effective method of control. Care must be taken to apply the poison spray to the tops of the trees where this insect is most abundant.

Bud Moth of Apples.—In the spring small brownish caterpillars often feed on unfolding leaves and blossoms. Arsenates in the sprayings suggested for apple orchards afford control, or arsenate of lead may be used alone. Spray as for tent caterpillars.

Case Bearers.—Small caterpillars, carrying protective cases either cigar- or pistol-shaped, often feed on unfolding leaves and are controlled by the same spray as bud moth caterpillars.

Borers.—Apple and peach trees are often girdled at the base of the trunk by borers. Sawdust-like castings and discoloration at

the ground line indicate the presence of apple borers and gum usually exudes when peaches are attacked. Young apple and peach trees of all ages should be carefully looked over at least once each year and, if evidence of this insect is found, the grubs should be cut out from the tree, care being taken that the tree is not completely girdled.

Blister Mite.—During the summer the brown, corky, thickened spots noted on the leaves of apple and pear trees indicate the presence of the blister mite. Summer treatment is useless, as the mites are between the upper and lower leaf surfaces. During the dormant season, lime-sulphur, at a strength about $\frac{1}{3}$ weaker than that recommended for the San José scale, controls the blister mite very effectively. (See table on page 487.)

Grape Root Worm.—Although this insect is not injurious in eastern New York, in the western New York grape sections it has done damage. The work may be recognized by the chain-like holes eaten in the leaves by the beetles. Cultivation will kill many of the pupae in the ground, and well enriched soil tends to aid much in keeping vines from reaching a badly weakened condition during such periods as the insect may be particularly abundant. Few beetles can be killed by poisons. Mechanical devices for catching beetles have met with some success.

Gipsy Moth (*Porthetria dispar* L.).—The gipsy moth is a prominent European pest, at present unknown in America outside of some of the New England States. It was established at Medford, Mass., through experiments with silk-producing moths, made about 1869 by Professor Trouvelot. The damage caused has been greater than is usual in Europe, other than in exceptional years when large forest areas are defoliated. In Europe many natural enemies, with adverse climatic conditions, are the repressive factors.

Fortunately, the female insect does not fly, hence the natural spread is extremely slow, being dependent on the crawling of the caterpillars or on the wind. Artificial spread, due to the transfer of egg masses on nursery stock and of caterpillars on vehicles, has brought the insect to New York State, but in all known cases infestation has been prevented. It is possible to eradicate colonies of the gipsy moth by the use of burlap trap bands, creosoting

egg masses and spraying. This has been done in other states with infestations of some years' standing. As new colonies may be treated more readily, it is of greatest importance that any suspicious cases be reported to the State Department of Agriculture, Albany, N. Y.

Brown-Tail Moth (Euproctis chrysorræa).—This is the common caterpillar of Europe. Under favorable conditions it becomes a serious pest, defoliating both fruit and shade trees in seasons of its abundance. The barbed microscopic hairs shed by the caterpillars produce an irritation of the skin akin to ivy poisoning. The section of France where fruit tree seedlings are grown was badly infested with these moths during the summers of 1908 and 1909, and many thousands of the winter nests containing caterpillars were taken from shipments made to American points. As far as known, all infestation was prevented by inspection and at present only in New England is the insect known in the United States. Any winter webs containing caterpillars should be regarded with suspicion and mailed for identification to the New York State Department of Agriculture, Albany, N. Y.

Shot Hole Borers.—These fruit tree bark beetles bore feeding galleries or burrows under the bark of weakened trees, which then show shot hole like entrances or exits. Sometimes quite vigorous trees are attacked, but usually this happens when the brush piles in which beetles are breeding are near. Heavy whitewashing of the trunks of trees is some protection, but the burning of all prunings, stumps and weak trees is of first importance.

Curculio.—Plums, apples, quinces and peaches frequently show crescent-shaped cuts on the fruit, which indicate the presence of eggs of the curculio. In plum orchards much affected fruit may drop, but in the other fruits the blemish is the chief injury. The beetles may be captured by jarring them from the trees upon sheets. Arsenate of lead, however, is now the standard remedy. This is used freely at 2 pounds per 50 gallons of water after the blossom period, and at two to three week intervals thereafter, should the beetles be present in numbers.

SPRAYING FOR FUNGOUS DISEASES

Fungous troubles are due to the growth of microscopic forms of plant life which subsist on plant tissues. These micro-

scopic plants reproduce themselves by spore bodies, microscopic in size and bearing the same relation to these plants as seeds do to larger plants. These spores, scattered in various ways, particularly during damp weather, start new infections wherever conditions for their growth are right. Treatment usually consists in coating all susceptible plant surfaces with dilute mixtures, caustic enough to kill these tender spores but not sufficiently caustic to greatly injure the plants sprayed. Treatment after the spores have begun to grow and have penetrated the plant tissues is usually ineffectual. Treatment must be preventive, not curative. Common fungous diseases are the various mildews, scabs, leaf spots, fruit rot, black knot, etc. Although bordeaux mixture has lead among fungicides, various compounds of sulphur are being used at present and for the apple these may be regarded as standard.

Apple Scab.—This most important disease of the apple injures both the leaf and fruit. Some varieties are more resistant to the growth of the fungus than are others. During winter the fungus remains in fallen leaves. In the spring spores are produced and carried to the opening foliage or young fruit during damp or rainy periods. Bordeaux mixture has been the standard preventive, but dilute lime-sulphur for summer use (see table, page 486) is now largely used. Arsenate of lead is added for all treatments after blossom time. The important seasons to spray are, just after the blossoms separate, before they open, and just after the petals fall. An additional spraying three weeks later is an advantage in damp seasons.

Pear Scab.—This is similar to apple scab in methods of control, although the substitution of lime-sulphur at summer strength is not as advantageous as with the apple.

Brown Rot.—The rotting of peaches, plums and cherries on approach of maturity depends much on conditions and varieties. For the tender peach foliage no fungicide has been found suitable, except the self-boiled lime-sulphur known as the Scott mixture and described on pages 486-487. Repeated applications are advisable.

Peach Scab.—This fungus, causing dark spots, is often noted on Salway, Hill's Chili and other varieties. Use the Scott mix-

ture of lime-sulphur after calyces are shed and repeat once or twice at three week intervals.

Black Rot.—Grapes may be protected in seasons when this fungus is destructive by sprayings with bordeaux made as leaves unfold and repeated three or more times through the growing period, if possible before rains. Bordeaux mixture seems never to injure grape foliage and it is often made more concentrated than mentioned in the formula given on page 487.

Black Knot.—This fungus grows on the European plum and on certain cherries. Spores scatter both in winter and spring. The most effective remedy is the preventive one of cutting all knots and burning them as soon as possible after their appearance. Bordeaux mixture affords considerable protection if used in the summer.

Leaf Curl of Peach.—This fungus causes the young leaves of peaches to thicken and become more or less pink in the spring. A whitish bloom is noted as the attack continues and practically all of the diseased foliage drops. Some varieties are quite resistant and in warm seasons the damage is not as great as in cool weather. Lime-sulphur or bordeaux, as buds begin to swell or earlier, is effective. In scale infested orchards, the lime-sulphur treatment for scale will also control leaf curl. Treatment after leaves are out is ineffectual. (See Cornell University Agricultural Experiment Station Bulletin 276.)

Fire Blight of Pears.—In summer blackened shoots bearing dead leaves and shriveling fruits often attract notice. This disease is bacterial in its nature and during the summer may be spread by pruning tools unless disinfected, and is also undoubtedly spread by leaf and bark puncturing insects. No spraying is effective. Cutting blighted limbs and the blighted spots on the trunks offers the only protection and this work should be taken up at the first appearance of blight. Corrosive sublimate, 1-1000, is used to disinfect cuts on limbs and tools. (See Cornell University Agricultural Experiment Station Bulletin 272.)

SPRAY FORMULAE

ARSENICAL POISONS

Arsenate of lead, paris green and London purple have been the leading forms of arsenic used to poison insects which con-

sume the surfaces of leaf or fruit. Of these arsenicals, arsenate of lead is preferred at present because it adheres well and has very slight burning qualities, even when used in excessive amounts. Commercial brands should contain not less than $12\frac{1}{2}$ per cent. of lead arsenate; some are stronger. With brands containing 15 to 20 per cent. of lead arsenate, proportionately less is required than is given throughout this bulletin in which the amounts are based on a $12\frac{1}{2}$ per cent. paste. It is well to paste the material with a small amount of water before diluting for use.

Arsenate of Lead.—Two pounds per 50 gallons or 5 pounds per 50 gallons. The stronger formula is never required except for the most resistant caterpillars, such as the gipsy moth.

Paris Green.—One-third to $\frac{1}{2}$ pound per 50 gallons. It is commonly used with bordeaux. When applied with water, a pound of stone lime should be added for each 50 gallons. (Paris green should not be combined with lime-sulphur for summer spraying.) In dry form paris green may be diluted at the rate of 1 pound with 10 to 50 pounds of land plaster, air-slaked lime or flour. It may be sifted through a bag or applied with a bellows.

Hellebore.—For a mild poison spray to be used in place of arsenicals, particularly on currants and gooseberries, fresh hellebore is commonly used at the rate of 1 ounce per 2 to 3 gallons of water.

CONTACT INSECTICIDES

Whale Oil Soap.—Whale oil or fish oil soap, when used at a strength of $1\frac{1}{2}$ to 2 pounds per gallon of hot water, is a convenient remedy for scale insects, if applied during the late winter. For summer use in the control of plant lice, pear psylla, etc., the maximum strength is about $\frac{1}{4}$ pound per gallon of water, and should be used at much less strength for tender foliage.

Kerosene or Petroleum Emulsion.—One-half pound of hard soap, 1 gallon of boiling soft water, 2 gallons of kerosene. The soap is dissolved in the hot water, the kerosene is added and all churned vigorously through a pump for some minutes until emulsified. The emulsion is diluted for use from 4 to 15 times.

Tobacco Water.—One-half pound of tobacco stems or leaves, steeped in a gallon of boiling water and later diluted with 5 to 10

gallons of water, makes a spray particularly useful against plant lice in summer.

Commercial Tobacco Extracts.—These are rapidly coming to the front for use against plant lice and pear psylla. The strength of dilution required depends on percentage of nicotine present, which should be guaranteed.

LIME-SULPHUR

Lime-sulphur washes have both insecticidal and fungicidal qualities. For scale insects the winter strength has long been used, and blister mite and the leaf curl of peaches are controlled by this same application. As originally made, the weight of lime used was greater than the weight of sulphur. This material formed crystals on cooling and consequently was only prepared as required. Professor Cordley, of Washington, introduced a formula in which the weight of lime is about one-half as great as the weight of sulphur and thus changed the mixture. This keeps almost indefinitely if contact with the air is prevented. It is possible to avoid nearly all sediment if a proper grade of lime be used and the wash can be boiled in concentrated form. Several modifications of the Cordley formula have developed during the past three years. The Geneva formula gives but little sediment with proper lime and unites the lime and sulphur in the best forms, although not so concentrated as in the Cordley formula.

*The Geneva Formula for Concentrate.**—Thirty-six pounds of lime (based on pure lime, CaO), 80 pounds of high-grade, finely divided sulphur and 50 gallons of water. When lime containing 95 per cent. or less than 95 per cent. of calcium oxid is used, more than 36 pounds must be taken, according to amount of impurities (38 pounds for 95 per cent. lime and 40 pounds for 90 per cent. lime) but no lime should be used containing less than 90 per cent. of calcium oxid or more than 5 per cent. of magnesium oxid. In boiling the solution, the liquid must not be allowed to drop more than slightly below the 50 gallon level.

Never use air-slaked lime or lime less than 90 per cent. pure or containing over 5 per cent. of magnesium oxid. Ground crystalline sulphur is not usually fine enough, but either flowers or the commercial flour of sulphur is sufficiently fine. The water is first heated and the lime and sifted sulphur added, or the

* See New York State Agricultural Experiment Station Bulletin 329.

sulphur may be pasted with a small amount of water. Sulphur may be readily pasted by being placed in a coarse sack, immersed in water and shaken. Stir well and boil one hour, adding water as needed to keep the liquid at 50 gallons throughout the boiling. The clear solution on cooling shows a density of 24° to 25° Beaumé and should be diluted with 4½ to 5 parts of water for scale spraying.

The Beaumé Test.—A convenient test of the weight or strength of lime-sulphur solutions is the Beaumé hydrometer. As the weight is approximately proportional to the amount of lime-sulphur in solution, any lime-sulphur solution may thus be compared and the amount of dilution required to reach any necessary strength found by reference to a "dilution table." Care must be used in the test that only the clear solution is tested.

DENSITY OF CLEAR SOLUTION IN DEGREES BEAUMÉ	DILUTIONS FOR SAN JOSÉ SCALE, FOR 1 GAL. OF LIME-SULPHUR SOLU- TION	DILUTIONS FOR BLIS- TER MITE, FOR 1 GAL. OF LIME-SUL- PHUR SOLUTION	DILUTIONS FOR SUM- MER USE ON APPLE OR PEAR, FOR 1 GAL. OF LIME-SUL- PHUR SOLUTION
	Gallons of water	Gallons of water	Gallons of water
33.....	8	11	40
32.....	7½	10½	38
31.....	7¼	10	36
30.....	6¾	9½	34
29.....	6½	9	33
28.....	6	8½	31
27.....	5¾	8	29
26.....	5½	7½	28
25.....	5	7	26
24.....	4½	6½	24
23.....	4¼	6	23
22.....	3¾	5½	21
21.....	3½	5	20
20.....	3¼	4¾	18

These tables are arranged to secure in diluted solution:

4.75 ounces of sulphur per gallon for San José scale.

3.56 " " " blister mite.

1.04 " " " summer spraying of
apples and pears as a
fungicide.

Commercial Concentrated Lime-Sulphur Solutions.—When composed of lime and sulphur only, the dilutions advisable may be ascertained by reference to the table and by the use of hydrometer.

Scott Formula.—Peach foliage is subject to injury by bordeaux mixture or the boiled lime and sulphur mixtures, even when much diluted. H. M. Scott, of the United States Depart-

ment of Agriculture, has used since 1907 lime-sulphur mixtures which have proved safe and have controlled peach spot and the brown rot when thoroughly and carefully applied. Very small amounts of the lime and sulphur actually combine, as happens in the boiled wash; hence the Beaumé hydrometer has no place in preparing the Scott mixture.

To prepare 50 gallons of this spray material, place in a barrel 8 pounds of fresh stone lime with water to cover the lime and, when slaking begins, add 8 pounds of sifted or pasted sulphur. Stir the mixture, while slaking continues, for 5 minutes, adding small amounts of water to keep the mixture free. At the end of 5 minutes add enough cold water to make 50 gallons and also cool the mixture to prevent the further formation of lime sulphids. Some slow slaking lime may require longer than a 5-minute interval, but the above is sufficient with a brisk, active lime. Strain out the lumps of lime. Lumps of sulphur should be worked through the sieve. If cureulio is troublesome, 2 pounds of arsenate of lead should be added to each 50 gallons of the above spray.

BORDEAUX MIXTURE

Bordeaux has been a standard fungicide for twenty years. For control of grape rot it is still the standard spray. It consists of 5 pounds of copper sulphate, 5 pounds of stone lime, and 50 gallons of water. The copper sulphate should be dissolved in half the quantity of water, while the lime is slaked, and then diluted with the other half. Pouring these dilute solutions together gives a much finer grained mixture than if the solutions are combined while in concentrated form. For apple and pear spraying the formula is often reduced to but 3 pounds each of lime and copper sulphate, to each 50 gallons of spray. Bordeaux should not be used on peach foliage.

GENERAL PLAN FOR APPLE SPRAYING*

1. Dormant season, before leaf buds open but just as they are swelling.
 - (a) Lime sulphur as a contact spray.
 - For San José scale 32° to 33° Beaumé, 1-8.
 - For blister mite 32° to 33° Beaumé, 1-11.

* From Cornell University Agricultural Experiment Station Bulletin 233.

2. After leaf buds open, but before blossoms open, *i. e.* when just beginning to show some pink. Watch weather and get spray on *before* rain, not after.

- (a) Lime-sulphur solution 32° Beaumé, 1-40, or bordeaux, 3-4-50, for apple scab (the fungus).

- (b) Arsenate of lead, 2-3 pounds to 50 gallons; added to lime-sulphur or bordeaux, as a poison for bud moth, cigar case bearer, canker worm.

This application should never be omitted during cold, rainy seasons.

3. After petals have fallen. Have spray on before rains come. *This is important.*

- (a) Lime-sulphur, 32° Beaumé, 1-40, or bordeaux, 3-4-50, for apple scab and leaf spot.

- (b) Arsenate of lead, 2-3 pounds to 50 gallons, used with lime-sulphur or bordeaux, for codling moth, canker worm, bud moth.

This is the most important of all the applications for control of apple scab and codling moth.

4. Ten days to two weeks later. Before rain period.

- (a) Lime-sulphur, 32° Beaumé, 1-40, or bordeaux, 3-4-50, for apple scab and leaf spot.

- (b) Arsenate of lead, 2-3 pounds to 50 gallons, used with lime-sulphur or bordeaux for codling moth and canker worm.

5. Eight to nine weeks after blossoms fall. Same as 4 for late scab infections and late attacks of codling moth. In most seasons this application is not necessary.

If aphid appears, spray before leaves curl with whale oil soap, 1 pound to 6 gallons, or kerosene emulsion diluted with 6 parts of water, or use one of the tobacco extracts.

GENERAL PLAN FOR PEACH SPRAYING *

1. Dormant season before the leaf buds begin to swell.

- (a) If scale is not to be combated, spray with lime-sulphur, 32° Beaumé, 1-15, or bordeaux, 4-4-50, or copper

* From United States Department of Agriculture, Bureau of Entomology, Circular 120.

sulphate, 2 pounds to 50 gallons of water for peach leaf curl. Any of these will be effective if properly applied. Spray from both directions to coat every bud, being sure to apply before buds have begun to swell.

(b) Lime-sulphur, 32° Beaumé, 1-8, for San José scale. This will also control peach leaf curl.

2. About the time the calyces or shucks are being shed from the young fruit.

(a) Scott's self-boiled lime-sulphur, 8-8-50, with arsenate of lead, 2 pounds to 50 gallons for scab and brown rot. As this is rather early for the scab and rot, the self-boiled lime-sulphur may be omitted, using merely (b).

(b) Arsenate of lead, 2 pounds to 50 gallons of water, for curculio. If the self-boiled lime-sulphur is omitted, add to each 50 gallons of water milk of lime, made by slaking 2 or 3 pounds of good stone lime. This will tend to counteract any caustic action of the arsenate of lead.

3. Two to three weeks later or about one month after petals fall.

(a) Self-boiled lime-sulphur, 8-8-50, for scab and brown rot.

(b) Add 2 pounds arsenate of lead for curculio.

4. About one month before fruit ripens.

(a) Self-boiled lime-sulphur, 8-8-50, for brown rot.

(b) Omit arsenate of lead.

PEACH YELLOWS

This is apparently a contagious or an infectious disease, the cause of which has not yet been discovered. All authorities who have studied the question agree that infected trees are a menace to surrounding healthy ones and recommend the removal of diseased trees as soon as found. How it spreads from one tree to another in the orchard is not yet known. Nursery trees grown from buds taken from infected trees invariably become diseased, although they may not be distinguished from the healthy trees for a time.

SYMPTOMS

1. Premature ripening of the fruit occurs a few days or several

weeks before time of normal ripening. The surface of such prematurely ripened fruit is usually highly colored, mottled and spotted with red and often slightly knobby or irregular to the touch. The flesh usually shows red streaks extending from the skin to the pit, and the flesh surrounding the pit is much redder than usual. The first year the premature fruit is often much larger than normal. In trees first showing the disease one small branch will often show this premature ripening and reddening of the fruit. Cutting off such a branch will not save the tree which should be destroyed.

2. Diseased trees often have upon the trunk and main branches upright tufted growths composed of one or more small wiry shoots with narrow, pointed, yellowish leaves. These are unmistakable evidences of the disease, but are not always seen in the season that the first premature fruit appears.

3. The leaf buds in the axils of the leaves that should remain dormant until the following spring open too soon.

4. In advanced stages the leaves become a sickly yellow color, although in early stages the foliage to the casual observer is often rich green and perfectly healthy in appearance.

Peaches prematurely ripened from winter injury, girdling, borers, root rot or drought never show the characteristics of prematurely ripened fruit on trees diseased with yellows.

LITTLE PEACH

SYMPTOMS

1. The fruit, much smaller than usual, ripens one to several weeks later than normal and has the color of a healthy peach. The flavor is generally poor, though in some instances, in the first stages of the disease, it is fairly good, differing little from that of healthy peaches.

2. The typical wiry shoots found with yellows are seldom or never seen with this disease.

3. Often a premature bursting of the buds in the axils of the leaves and a pushing out of concealed buds on the main branches, very similar to that in yellows, is seen. These, however, do not develop into the wiry shoots or bushy growths characteristic of yellows.

4. At the first appearance of the disease, the leaves in the lower portion of center of the tree change to a light yellowish color, the outer leaves of the tree often appearing perfectly normal. In old cases or as the disease advances, all the foliage becomes affected. The leaves at the base of the young growth and in the inner part of the tree commonly droop downward and curl inward, giving the characteristic clutching appearance of the leaves which, together with their yellowish color, is the most certain means of identification. The small and retarded ripening of the fruit, in addition to the above foliage characteristics, is the only known means of diagnosing the trouble. By a careful comparison of diseased and healthy trees in the orchard the grower can soon learn more than by any amount of printed description. Frequently when diseased trees have no fruit upon them it is difficult to determine whether they are affected with yellows or little peach or both. Yellows and little peach may be different manifestations of one disease.

REMEDY FOR PEACH YELLOWS AND LITTLE PEACH

The remedy for little peach and for yellows is the same, *viz.*: the removal of diseased trees. In peach growing sections, the orchardists who have continued the longest as successful peach growers destroy trees affected with these two diseases as soon as found. How these diseases spread is unknown, but in some instances buds from infected trees have been used in nursery budding and a large percentage of the resulting trees developed disease when two and three years old. Commercial growers recognize the fact that diseased trees are a menace to surrounding healthy ones, and the New York State agricultural law provides for their removal.

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